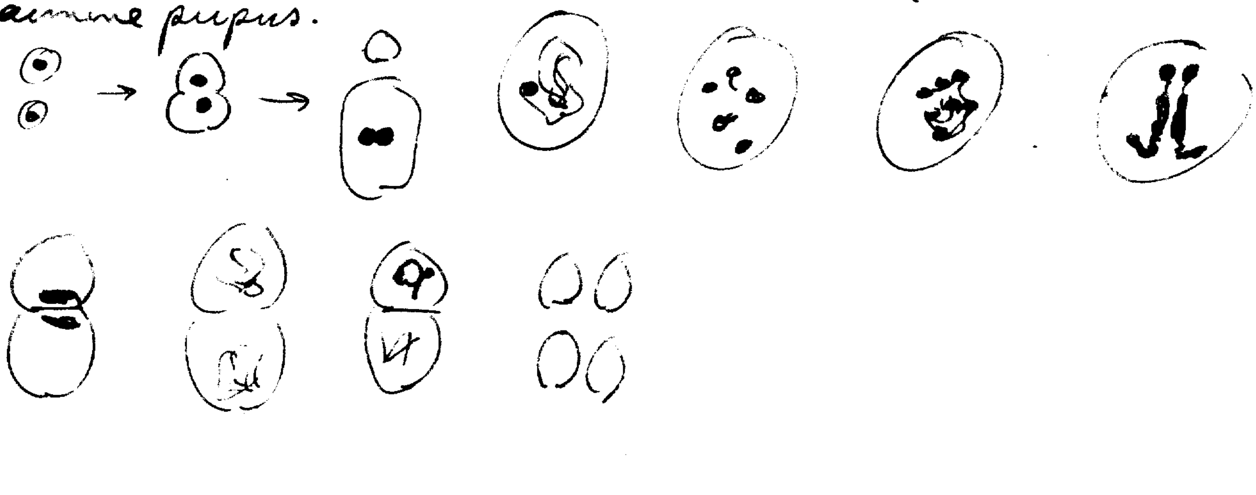
Lindegren, CC + Ralph R Mellon, Nuclear Phenomena suggesting a sexual mechanism for the tubercle bacillus.
Proc Soc 30:110 - 1932.

Mellon et al Proc Soc 30:80 1932

AFB → filterable gonidia → non AF diplococci →
tetrad diplococcus → diphth → acidfast gonidia → R tbc
→ S tbc

Aceto Carmine pupus. 7 chromosomes



Marchal, J G   Contribution à l'étude de la variation en microbiologie. Th. doc. sc nat, Nancy 307p. 1932.
: from Année Biologique

temporary variations in pigment in prodigiosus:

Ca and Mg. in pigm prod.

Brown, F.M. + H M Heffron, Science 49:198–200 (1929). Mendelism among bacteria?

B. lutzii (Brown)

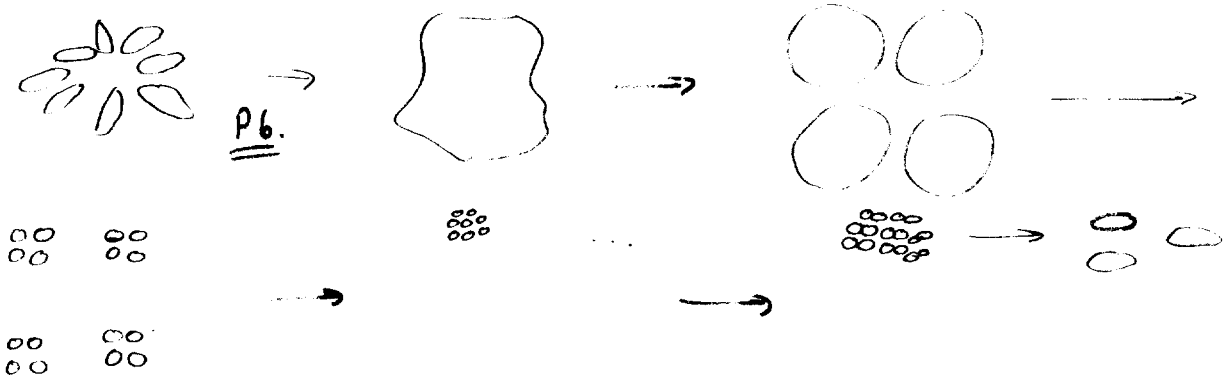
yellow "bacillus"   G+ young cultures   "sph. refractile bodies" in old cult

a) yeast like organism associated   "both, while annoying at the time have been
b) loss of color.   found to be merely phases in the life history..."

a) filament formation in old cultures

b) sudden toxin: e.g. P6. : 8 rods fuse into a mass, staining intensely c̄ fuchsin   "symplasm."

Mass ~~dsso~~ divides into 4 sph. non staining bodies. Each of these → tetrad → 16 "cocci"   On transfer to new medium; cocci divide and → rod form.



In white strains, old cultures, or symplasm formation → both yellow + white colonies. Each bred true in daily transfers. Single cell isolations of each made q 2 wks. After 11 transfers, "substrains that showed no change of color from the 1st. single cell isolation were taken and considered to be pure strains of that color".
Serologically identical
Both cultures were mixed. On transfer, almost entirely white.
(Fountain Valley School, Colorado Springs, Colo);

isolated symplasms from mixed cultures in Pb-nutrient agar slant grown in broth and plated out. → 362:138 w:y. (8:3)

→ w + y   w > y.

In one instance → all white.

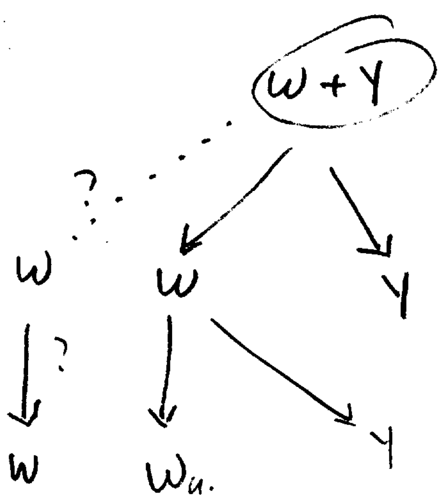
V. imp: single cell isolation after mixed culture???

1. Pure strains stable

2. Mixed cultures → unstable white colonies.

Assume that there is a diploid segregation in F_1 $\bar{c}$ dominance.

1) Should have studied the progeny for variance.



Gowen + Lincoln J Bact 44:551- (1942) A test for sexual fusion in bacteria

1. yellow + wh. strains of Phytomonas stewarti.

a) Looked for heterozygous colonies, replating colonies from mixture. Also watched by R.S. No recombinations found.

4/2072 mixed colonies found. Stable on replating

(This is not unexpected in view of a small % of sticking together.

2. Recombination of characters (haploid)

509 - large, smooth, mucoid, wh. 400 sm, rough, non m, yellow.

Mutations observed in parentals, as frequently, as in mix culture.

↓

agg. recombinations.

LSMW

509

$L^+S^+M^+Y^-$

$L^-S^+M^+Y^-$

~~LSMW~~ $L^-S^-M^-Y^+$

↓ $L^-S^-M^-Y$

no multiple changes.

Data not analysed.

>200 000 colonies examined.

no literature.

See J Bact 33.

Foshay, L + W. Hesselbrock, J Bact 49: 233- . 1945. Some observations on the filtrability of B. tularense.

Frames ca 300-350 mμ demonstrated by infectivity + cultivation.

Knaysi A ~~50~~ J Bact 49:1-5 (1945) On the structure of anaerobic bact.

Hollande, Arch Protistenk. 83: 465-608 (1934) Contr. à l'étude cytologique des microbes (Coccus...)

Dienes, L. J Bact 50: 441-458. Morphology + Nature of the Pleuropneumonia group of organisms.

(R)

Altenr - Weber, E., et al J Bact 50: 291-5 (1945) The effect of incompletely inh. conc. of penicillin on E coli. Dept Labs; Jewish Hosp. Brooklyn N.Y.

Nutrient broth:

75 units/ml Grams → "bipolar" diphtheroids*

Lys. at 300/ml

at 100, mycelium

150 "zygospores"

200 only small cells.

Acle, P.A. J Bact 51(6): 699-701 (1946) Mutation in certain phytopathogenic bacteria induced by acenaphthene.

Pl Path
UC Berkeley

Phytomonas michiganensis + Erwinia carotovora

acenaphthene saturated nutrient broth. 2 wks 28°.

In P. mich "a sudden + complete mutation." → only a wh. shiny smooth type of colony. Neither intermediate nor typical forms were found after a certain time.

E. carot → several types - *pred.* grayish compact flat colony

Ramchandani, J. C. Ann. Bot. 44: 975-987 (1930) Saltations in Bacteria. III B. violaceus

color variations.

Scrib. 40: 2, 43: 579.

→ wh. mutant + reversion.

Hort. EC PRS B89: 468 (1917). Morph St. in the Life History of bacteria.

Budding? (Centric. eq.)

Stewart FH J Hyg 27:379-95 (1928) The life cycle of bacteria: alternate asexual and autogamous phases.

Rosen HR Mycologia 20: 251-75 (1928) Variations within a bacterial sp - I Morphologic Variations Ark.

"Gurney-Dixon, S. "The transmutation of bacteria" 1919.

"B. mesentericus?" Tiny particles attached to flagellae were seen. interpreted as gonidia.

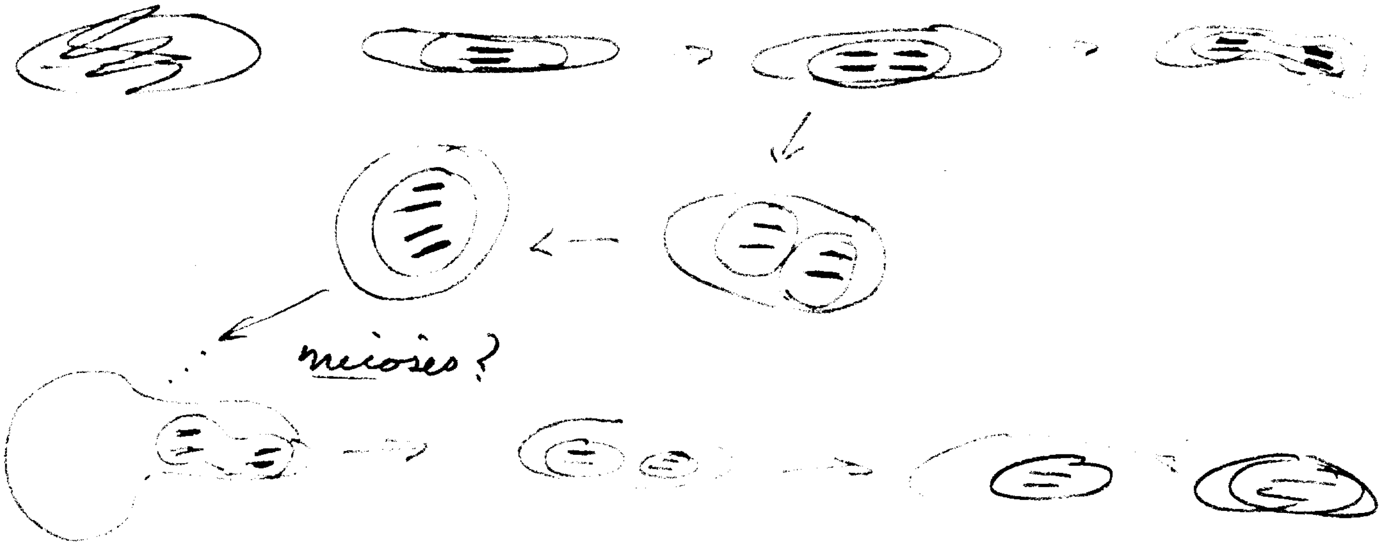
No direct evidence of vitality. Filtrates did show culture.

∴

not relevant.

Beebe, J.M. J Bact 42: 193-223 (1941) The morphology and cytology of Myxococcus xanthus n.s.
Univ. Ariz. Tucson. (R)

Describes nuclei c̄ 2 chromosomes and autogamous fusion before sporulation. Meiosis not observed.



(Seems OK.) But a myxobacterium!!

Nyberg, C. Acta Soc Med Fennicae 12: 1-18 (1930) Zur Biologie des Bacillus mycoides.

Broadhurst, J. ~~Ee~~ J Bact 27: 48 (1934) SAB.
Zygotephases in bacteria.

[Fried "Fommel 1926; Wygodtschikoff + Manuilowa 1930
Roux + Yersin 1890.

Classification of Literature.

1. Growth
   - a general
   - b growth factors
   - c " " – analogues
   - d antibiotics
   - e regeneration – see sp. organs
   - f genetics.

2. Genetics
   - a transmission
   - b gene acting on gene; induced mutation.
   - c action
   - d biochemical, in microorganisms
   - e other, " "
   - f adaptive enzymes.

JPB
JCP
JLCM
JEM
J Col Res
J.O.Ch.
J.Ph.Ch.
Faraday Soc.
J.Imm.
J.Hyg.
J.Chem Soc.
J. Exp Ph + Th.

Enzymologia
Advances

Biol Rev.
Bact Rev.
Q.R.Biol

"Flux" in "specific" proteins not established.

Is order specific???

Is order maintained in denat.??

Are no sp. proteins made by enzymes??

Spont. renaturation.

"Specificity" — enzymatic + substrate.
immunologic
[genetic].

How else.

Brails J 39(5):) 1945.

$B \xrightarrow{m} B/r$

$r \xrightarrow{m} r'$ $\qquad$ $r' \propto B,\ B/r$

$Br \xrightarrow{m} Br\alpha.$ $\qquad$ $\alpha \not\propto Br\alpha$

$r' \propto Br\alpha.$

$\therefore$ this mutational resistance is specific.

$B\alpha_1 \xrightarrow{m} B\alpha_1 r'.$ $\qquad$ $r', r \not\propto B\alpha_1 r'$

$\alpha_1 \propto B\alpha_1 r'$ $\qquad$!!!

$B\alpha_1 r' \xrightarrow{m} B\alpha_1 r'\alpha$ $\qquad$ resistant to α, r, r'.

The mutant viruses are all active in original host!

$B \xrightarrow{m} B\alpha_1.$

$B \xrightarrow{m} B\alpha_2.$ small colony mutant on nutrient agar!

$T1 = \alpha$

$T2 = r$

Bacteriology 231
April 17, 1952

M. R. De Carlo

Some Aspects of the Nitrogen Metabolism of a Lysogenic Strain of *Bacillus megaterium*

The total nitrogen of the infected and uninfected cells was determined by the semi-micro Kjeldahl technique. The uninfected cells were found to contain a larger amount of total nitrogen than the infected cells. It was found that the desoxyribonucleic acid (DNA) content of the infected cells was slightly higher than that of uninfected cells. The presence of the virus in lysogenic cells in the immature form is believed to be the explanation for the slightly larger amount of DNA in the infected cells.

The technique of Feldman and Gunsalus was used to study the activity of the transaminases of *B. megaterium*. Pyridoxal-PO_4 was required as a coenzyme and a number of amino acids could serve as amino donors.

The effect of sodium azide, sodium fluoride and iodoacetate on growth and virus production was studied. NaF had little or no effect in the concentrations used. Sodium azide and iodoacetate depressed growth and virus formation. The inclusion of ATP in the medium, along with the inhibitor, produced inconclusive results.

Studies with N^{15}-ammonium carbonate showed that after a 30 min. exposure the amount of N^{15} taken up by both strains was the same. A study of N^{15} distribution in amino acids, purines and pyrimidines was done also.

A complex amino acid medium was developed; it supported better growth of the lysogenic strain than nutrient agar, the amount of virus produced was significantly less. The addition of asparagine or adenine to the amino acid medium increased virus formation.

The two strains of *B. megaterium* were grown on synthetic media containing purines, pyrimidines and nucleotides as the sole sources of nitrogen. The uninfected cells showed good growth on these media, but the growth of the lysogenic strain was only fair. The lag phase could be shortened appreciably with larger inocula, i. e., direct transfer. Little or no ammonia was liberated, and there was little change in pH over a 48 hour growth period. Attempts to isolate and identify intermediate products of metabolism by chemical methods, paper chromatography and UV irradiation were unsuccessful.

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Lwoff, A., and Gutman, A. 1950 Recherches sur un *Bacillus megaterium* lysogene. Ann. inst. Pasteur, 78, 711-739.

4/52

Rhoades ijap "Unités .... 1950"

① Ij ij shows no effect. ② Gives ij ij segregants which are striped. ③ Striped segregants × Ij → striped Ij ij F_2. ④ Striped F_2 × Ij ij → striped Ij Ij (genetic marker.

1. ∴ Plastid abnormality is inherited at least two generations in presence of Ij. Further selfing of Ij Ij ??.

② Virus is brought in from ij Ij stock. This virus has no effect in presence of Ij but can be propagated in presence of ~~Ij~~ ij.

See Jenkins MT J Her. 15: 467-472.

Notes that green Ij ij plants show "conditioning"

In summer-grown plants, F_1 plants are pure green. In out-of-season plants (e.g. 4 mos for maturity) white-striping is seen: intracellular competition.

lettuce modifies ijap plastids in same sense as others.

Other genes do not behave in the same way. (1948)

Iojap. ij/ij are striped.

ij ♂ × Ij → normal F_1. ij ♀ × Ij → white and striped as well as green F_1.

F_2

3:1 $Ij : ij$

ij plastids are smaller as well as chlorotic. "Both types of plastids were found in certain green cells".

Striped F_1 (ij ♀ × Ij ♂) × unrelated Ij → plants ½ should be $Ij\ Ij$.

Occasionally all progeny of a backcross ear (white sector) were wh seedlings, though ½ were $Ij\ Ij$. Concludes that mutant plastids retain their individuality.

(Persistence of striping in $Ij\,Ij$ striped plants ?)

Later, glossy-1 was used to mark Ij to prove homozygous condition. Normal sized plastids were paler in cells adjacent to white tissue. Also proportion of white offspring less than expected from proportion of maternal white tissue. Direct effect of ij on cytoplasm supposed: indecisive whether the permanent changes are in cytoplasm or plastid : plastid or plasmagene mutation ?

Segregation as ear of Rhoades' case is best evidence for cytoplasmic factor

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